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Department of
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Forest Service

Northeastern Area

Cooperative Detection Survey of Red Pine Adelgid, *Pineus boerneri*, and Red Pine Scale, *Matsucoccus resinosae* in Massachusetts, New York and Rhode Island

Detection Survey

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Prepared by: Parker Snowden, Entomologist; Forest Pest Management, USDA Forest Service, PO Box 640, Durham, NH 03824

ABSTRACT

Red pine scale, *Matsucoccus resinosae* Bean and Godwin, and red pine adelgid, *Pineus boerneri* Annand, are injurious pests on red pine in plantations, nurseries, and ornamentals. Although both insect species are presently established south of the natural range of red pine, *P. boerneri* and *M. resinosae* are moving northward towards these natural stands in Massachusetts and New York. This is a report of a 1985 cooperative survey of both insects by State and Forest Pest Management personnel in Massachusetts, New York and Rhode Island.

Results of the survey indicated that *P. boerneri* is present in all of Rhode Island, most of central Massachusetts and all of Cape Cod, and two towns (1 unconfirmed) in New York. Population densities of the *P. boerneri* were light in both Massachusetts and Rhode Island. Population density was not determined in New York. Another adelgid, *P. coloradensis*, which is an innocuous species to red pine, was very numerous on many red pines. *M. resinosae* was found in four new towns in New York but none were found in Massachusetts and Rhode Island.

Since *P. boerneri* infestation is very close to the natural range of red pine in Massachusetts and New York, annual surveys should be made by state cooperators to monitor the advancing front of the infestations. New York has undertaken measures to limit the spread of red pine adelgids and red pine scales.

INTRODUCTION

Red pine scale, Matsucoccus resinosae Bean and Godwin, and red pine adelgid, Pineus boerneri Annand, are pests on red pines in plantations, nurseries, and ornamental plantings. Both insects cause flagging, discoloration of needles, distortion and cracking of branches, and death of the trees in 5 to 10 years after infestation.

Red pine scale is known to be present in Connecticut, New York, New Jersey and Pennsylvania (Figure 1). P. boerneri is reported from Connecticut, Massachusetts and Rhode Island (Figure 1). It was also suspected of being in New York. Although these two species are presently established south of the natural range of red pine, red pine adelgids are moving northward towards these stands, and may, in time, infest them. Here is the report of a cooperative detection survey of both insects, made from October 1984 to February 1985 in Massachusetts, Rhode Island and New York. This survey did not include the state of Connecticut because the Connecticut Agricultural Experiment Station has been monitoring the populations of both insects for some time.

Objective

The purpose of the survey was to determine the distribution and the range of M. resinosae and P. boerneri outside of Connecticut, and to determine population density of red pine adelgids outside of Connecticut.

Cooperation

Entomologists and pest management specialists in Massachusetts, New York and Rhode Island collected twig samples from suspected infested stands. Parker Snowden, Forest Pest Management, Forest Service, USDA, Durham, NH, identified red pine scales and red pine adelgids and made mounted slides of the adelgids. Mark McClure, Connecticut Agricultural Experiment Station, New Haven, Connecticut, identified and confirmed identification of the adelgids, if any were questionable.

Survey Method:

Survey Area

At least one red pine stand was to be examined in each township (approxmately 25 square mile quadrant) in the participating states. However, in some areas, it was not possible because (1) no host trees were found for sampling, (2) not enough host trees were present in a stand, or (3) host trees were too tall for sampling. Intensive sampling carried out by the cooperators on the periphery of the known infestation areas.

Sample sites were selected from stand planting records, forest inventory records and other available records. In Massachusetts,

59 sites were examined for P. boerneri, 4 in Rhode Island, and 9 in New York.

Each selected stand was examined to detect typical signs of the scale and adelgid damage: mortality of lower branches, "flagging" or dead olive green to bright red terminal branch clusters in lower crowns. Usually, these symptoms were obvious in the lower crown of edge trees and on suppressed trees.

Sample branches were collected only from stands showing signs of injury. Five trees per stand were sampled in each township. From each tree, four live branches, preferably branches showing discoloration and injury were cut - one from each cardinal direction. Dead branches were not sampled. These branches were placed in a plastic bang and taken to the state office laboratory for examination.

The sample branches were examined for the presence of living scales and adelgids. On each branch, 50 bark flakes were lifted. The soft bodied insects found under bark flakes were removed and placed in 70 percent alcohol. The number of living scales and adelgids were recorded on data sheets.

The population density of red pine adelgids was determined by counting the number of living adelgids from 200 bark flakes (1000 from 5 trees in a stand).

a) >100 adelgids/100 bark flakes = very high population
b) 51-100 adelgids/100 bark flakes = high population
c) 26-50 adelgids/100 bark flakes = medium population
d) <25 adelgids/100 bark flakes = light population.

Population density of red pine scale was not determined. Temporary slide mounts for the adelgids which were in 70% alcohol were made as follows:

1. Incision made in abdominal area of the adelgids.
2. Specimen(s) transferred to cold 10% KOH for 24 hours.
3. Body contents flushed out using a spatula.
4. Specimen transferred to a few drops of 70% alcohol in water and body contents flushed out again.
5. Specimen placed in a drop of PVA (Polyvinyl alcohol) and a cover glass gently positioned and placed on it.
6. Slide heated over a hot plate for 1-2 minutes.
7. Slided allowed to cure (48 hrs) for examining and shipping.

I identified red pine scales and made slide mounts and identification of some adelgids from Massachusetts and Rhode Island. Dr. Mark McClure confirmed identification of P. boerneri.

Results

Of the 59 sampling sites (townships) examined in Massachusetts, P. boerneri was found in 14 of them (Figure 2).

Of the 4 sampling sites (townships) examined in Rhode Island, P. boerneri was found in all 4 sites. The survey of the infested site in the northeast corner of Rhode Island was made by Massachusetts cooperators (Figure 3).

Of the 9 sampling sites (townships) examined in New York, P. boerneri was found in two sites - one confirmed and one unconfirmed. The specimen in the unconfirmed site was lost in transit and identification could not be confirmed (Figure 4).

M. resinosae was found in 7 of the 9 sites in New York. Four of these sites, namely Beekman, Dover, Unionvale, and Washington, were new infestations (Figure 4). No red pine scales were found in any site in Massachusetts and Rhode Island.

Population densities of P. boerneri were light (less than 25 adelgids/100 bark flakes) in Massachusetts and Rhode Island (Table 1). Population density will not be determined in New York because not enough trees could be found to make a stand.

Table 1.--Number, location and damage of red pine stands in Massachusetts and Rhode Island infested by P. boerneri at various densities.

Sampling Sites	No. of Stands Sampled	Infested	P. boerneri beneath 100 flakes			
			<25	25-50	51-100	>100
Massachusetts	59	14	14	0	0	0
Rhode Island	4	4	4	0	0	0

Discussion

A survey made by Mark McClure, Connecticut Agricultural Experiment Station in 1980 indicated that P. boerneri are well established in most of Connecticut, most of Rhode Island and a small portion of south central Massachusetts (Figure 1). The results of the 1985 survey indicated that the adelgid infestations are moving northward and eastward at a rapid rate.

As indicated in Figure 2, the advancing front of the infestation is well defined in western and northern Massachusetts. However, in the eastern portion it is not well defined because no infested sites were found in Middlesex and Suffolk Counties. These two counties were intensively sampled for P. boerneri. It is probably present on red pines in these counties, but the population is very low. Thus, a hypothetical distribution range, indicated by dotted lines, represents or delineates the advancing front of the infestation in eastern Massachuetts. The infestation is about 5-10 miles from the natural range of red pine in Massachusetts and is very close to the natural range of red pine in Connecticut and New York. Like red pine scale, the adelgids are spreading mainly by wind disperal of young nymphs. However, the isolated infested sites on Cape Cod and Lancaster, Massachusetts indicate that probably the insect was transported by birds, motor vehicles or nursery stock or other red pine products.

In New York the advancing front of the infestation is not too well defined because P. boerneri was found in two isolated towns. Results of the 1985 survey in New York indicate that both red pine adelgid and red pine scale infestations are close to or in the fringe of natural stand of red pine. Data from the 1981 red pine scale survey made by New York personnel indicates that the scale is advancing northward at about the same rate as red pine adelgid. If the town of Washington is in the natural range of red pine, then the scale is already present in the natural red pine stands in the town of Washington.

Another adelgid, P. coloradensis (Gillette) was very numerous on many red pines. This adelgid, which is widely distributed in North America on many pines, is an innocuous species to pines and feeds mainly on needles or in the uppermost part of the needle sheath. Other unidentified adelgids were also collected on many red pines.

Conclusion

Since M. resinosae and P. boerneri are very close to or in the fringe of natural red pine stands in New York and Massachusetts respectively, annual surveys should be made by the States in cooperation with the Forest Pest Management staff, USDA Forest Service to monitor the advancing fronts of the infestations in these states.

New York has already initiated measures to limit the spread of both P. boerneri and M. resinosae by:

1. Prohibiting the sale of red pine trees from their Saratoga tree nursery in the infested areas.

2. Publishing educational materials and new releases to advise the public to plant trees other than red pine in the infested areas and to salvage infested red pines for wood products.

Other states should consider similar measures to limit the spread of P. boerneri.

References:

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McClure, Mark. Distribution and damage of two Pineus species (Homoptera: Adelgidae) on red pine in New England. Annals Entomological Society of America 75(2):150-157. 1982.

McClure, Mark. Influence of cohabitation and resinosis on site selection and survival of Pineus boerneri Annand and Pineus coloradensis (Gillette). (Homoptera:Adelgidae) on red pine. Environmental Entomology 13:657-663. 1984.

McClure, Mark. Pineus boerneri Annand (Homoptera:Adelgidae): A new or another record from the People's Republic of China? Proceedings of the Entomological Society of Washington 88:460-461. 1984.

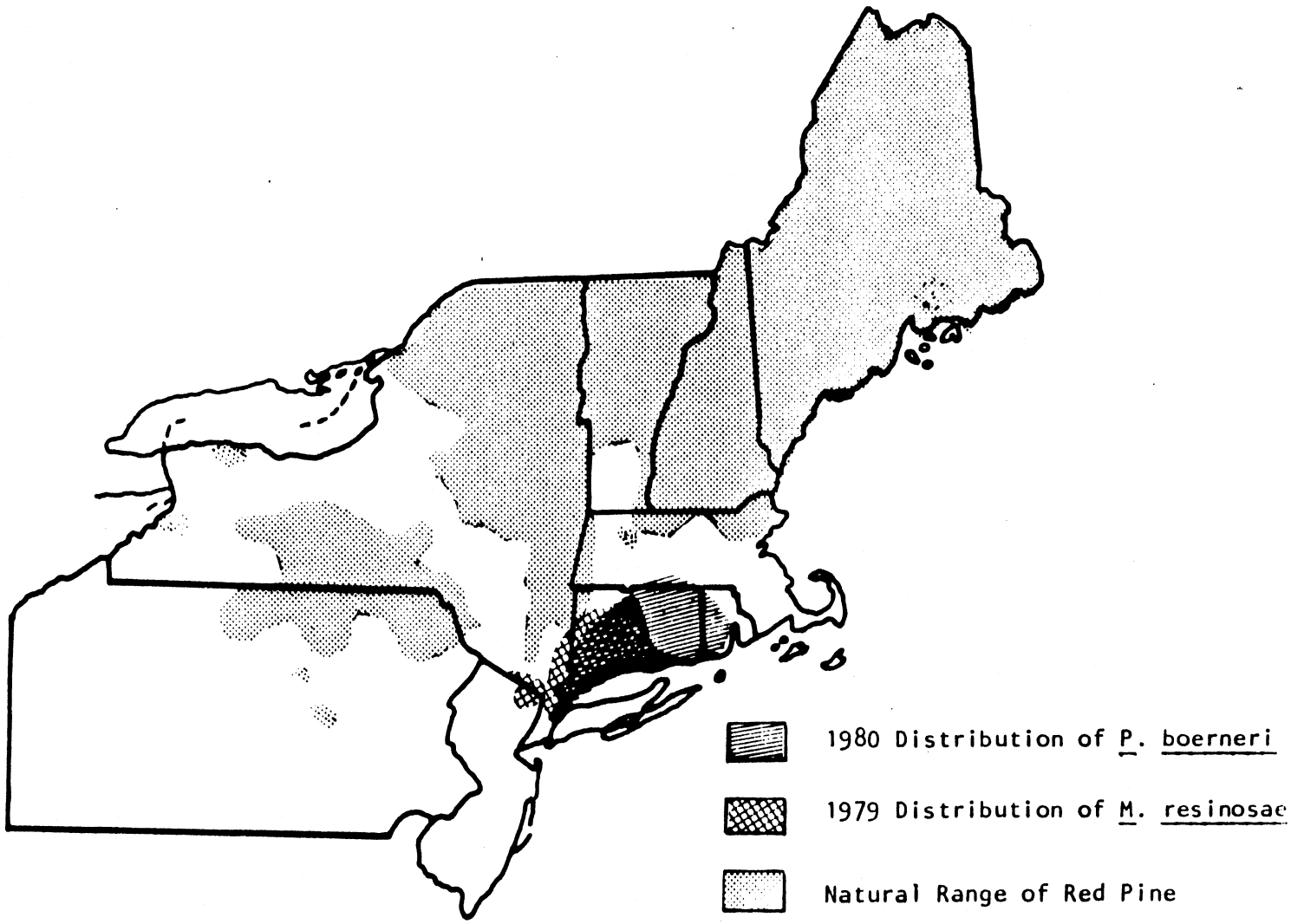
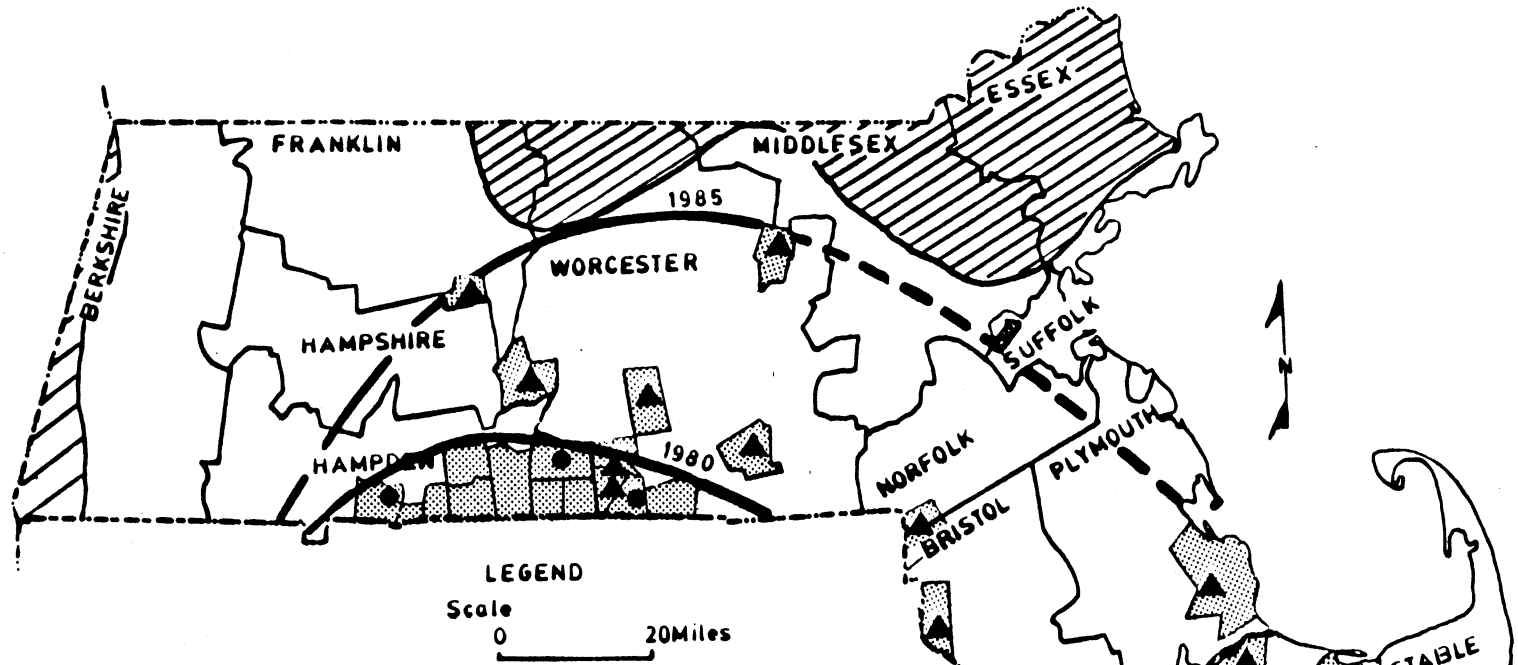


Figure 1.--Distribution of M. resinosae (1980) and P. boerneri (1979) in Northeastern United States and natural range of red pine.

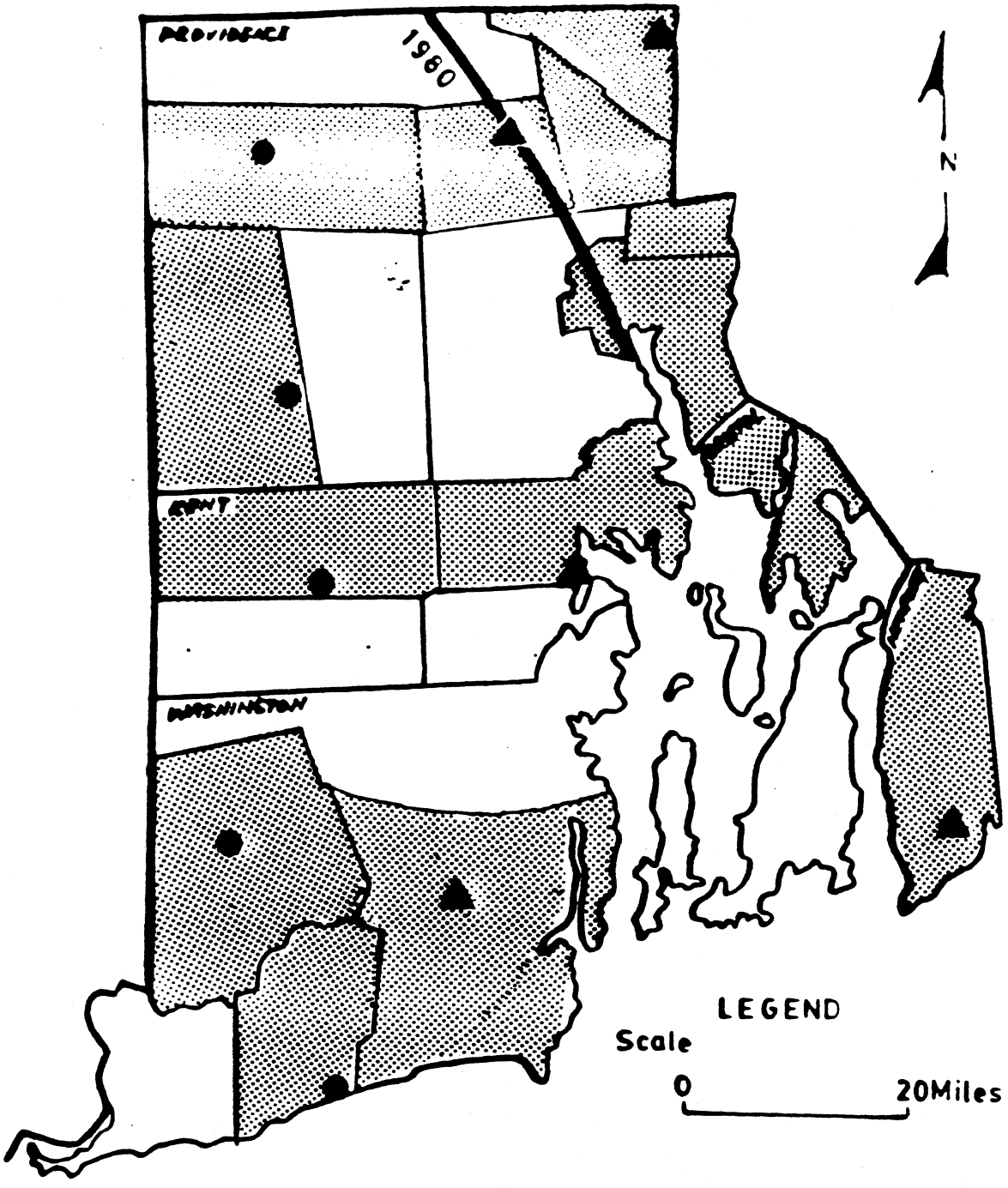


● Location of those sites sampled in 1980 to determine the distribution of P. boerneri on red pine and found infested.

▲ Location of those sites sampled in 1985 to determine the distribution of P. boerneri on red pine and found infested.

▨ Southern tip of natural range of red pine in Massachusetts.

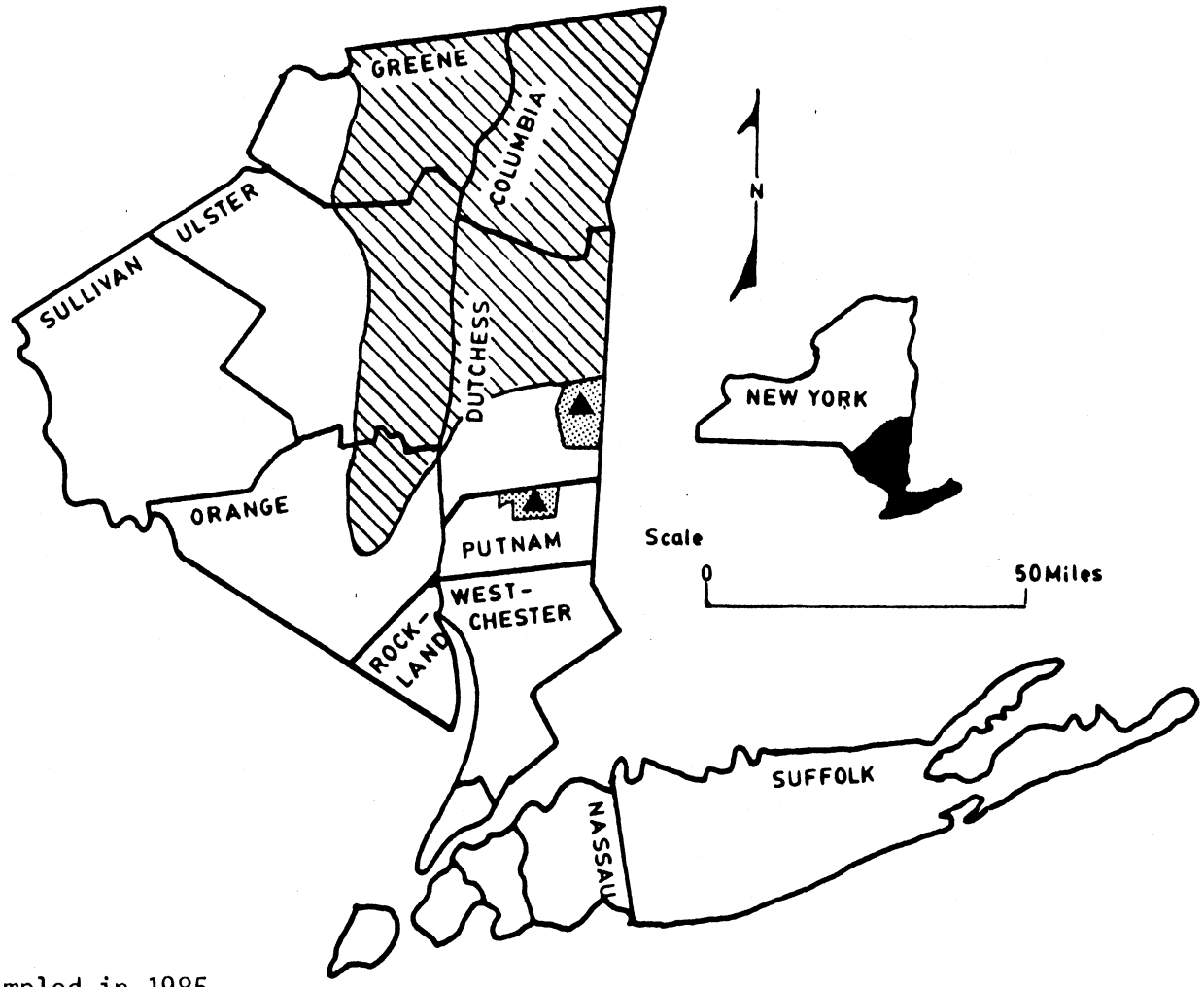
Figure 2.--1985 Distribution of P. boerneri in Massachusetts



● Location of sites sampled in 1980 to determine the distribution of P. boerneri on red pine and found infested.

▲ Location of sites sampled in 1985 to determine the distribution of P. boerneri on red pine and found infested.

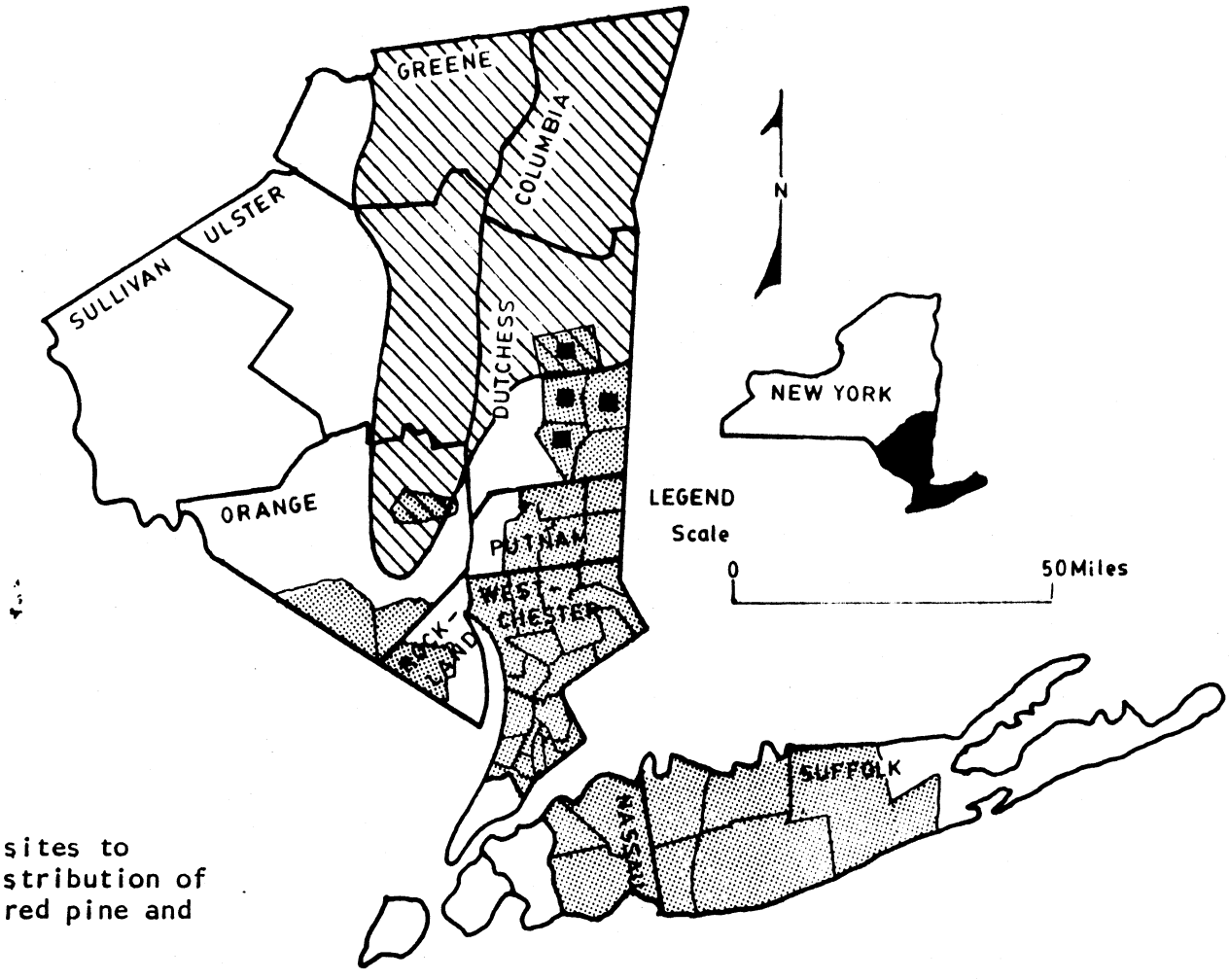
Figure 3.--1985 Distribution of P. boerneri in Rhode Island



Location of sites sampled in 1985 to determine the distribution of P. boerneri on red pine and found infested.

Southern tip of natural range of red pine in New York

Figure 4.--1985 Distribution of P. boerneri in New York



Location of new sites to determine the distribution of M. resinosae on red pine and found infested.

1981 Distribution of M. resinosae in New York

Southern tip of natural range of red pine in New York

Figure 5.--1985 Distribution of M. resinosae in New York